

# COMPARISON BETWEEN CONTINUOUS AND INTERMITTENT ACTIGRAPHY OUTCOMES DURING LONG DURATION MISSIONS

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## Introduction

- Astronauts typically wear actigraphy watches continuously during their missions inflight
- In late 2020, astronauts were scheduled to wear an actiwatch for one 2-week period every two months
- Our aim was to compare sleep outcomes between data collected continuously vs intermittently to identify whether intermittently collected sleep data would yield similar results

## Methods

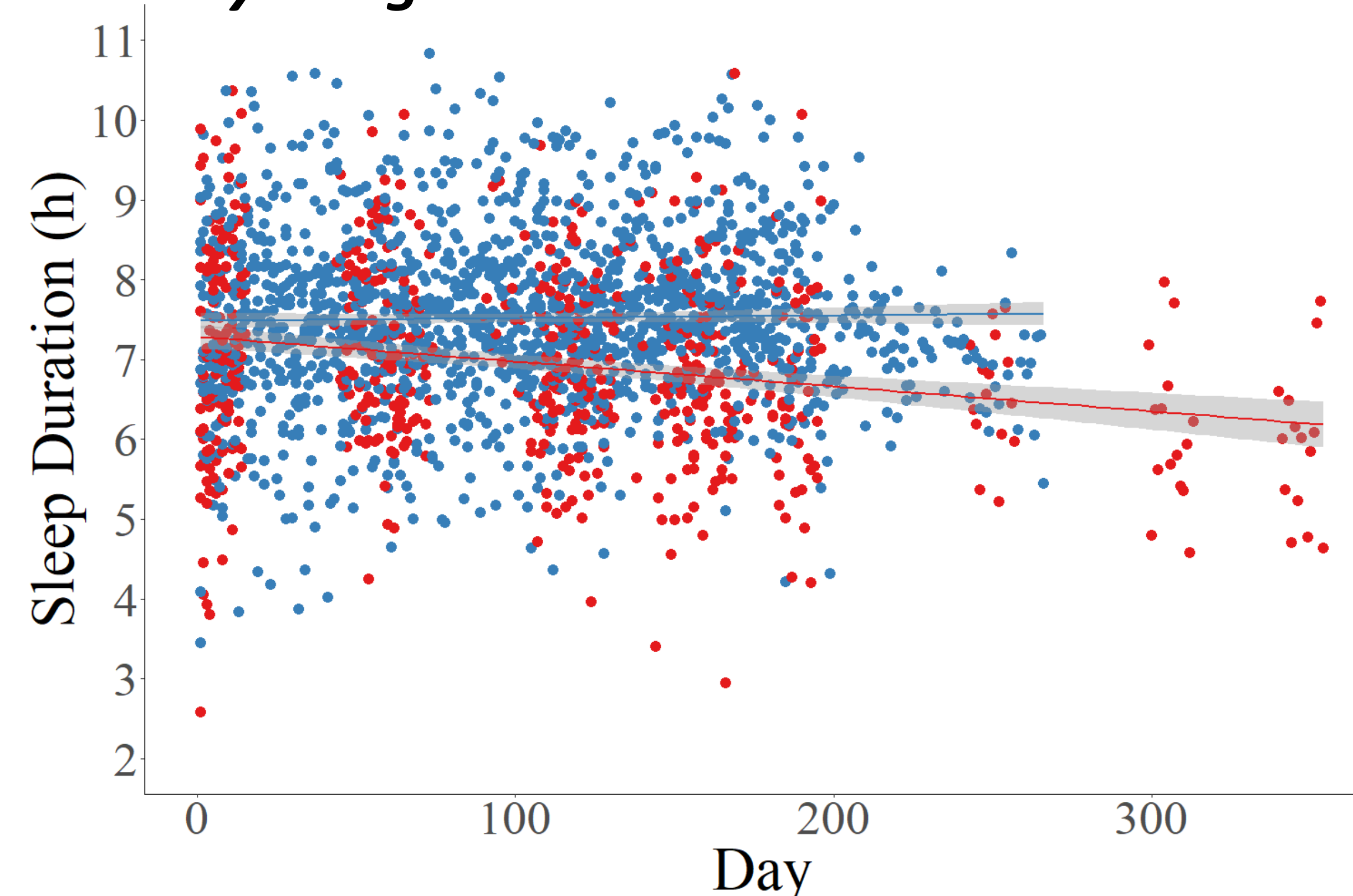
- N = 19 (7F) Crewmembers (mean age 45 +/- 7 years), volunteered from NASA Standard Measures protocol between Jan 2019 and Mar 2022
- Actiwatches were worn either **continuously** (C; n = 9) or for **two weeks** every two months while in space (2W; n = 10)
- Sleep outcomes measures comparing the C vs 2W actigraphy collection:
  - sleep duration (h), sleep efficiency (%), number of awakenings (n), wake after sleep onset (min; WASO), and sleep latency (min)

## Results

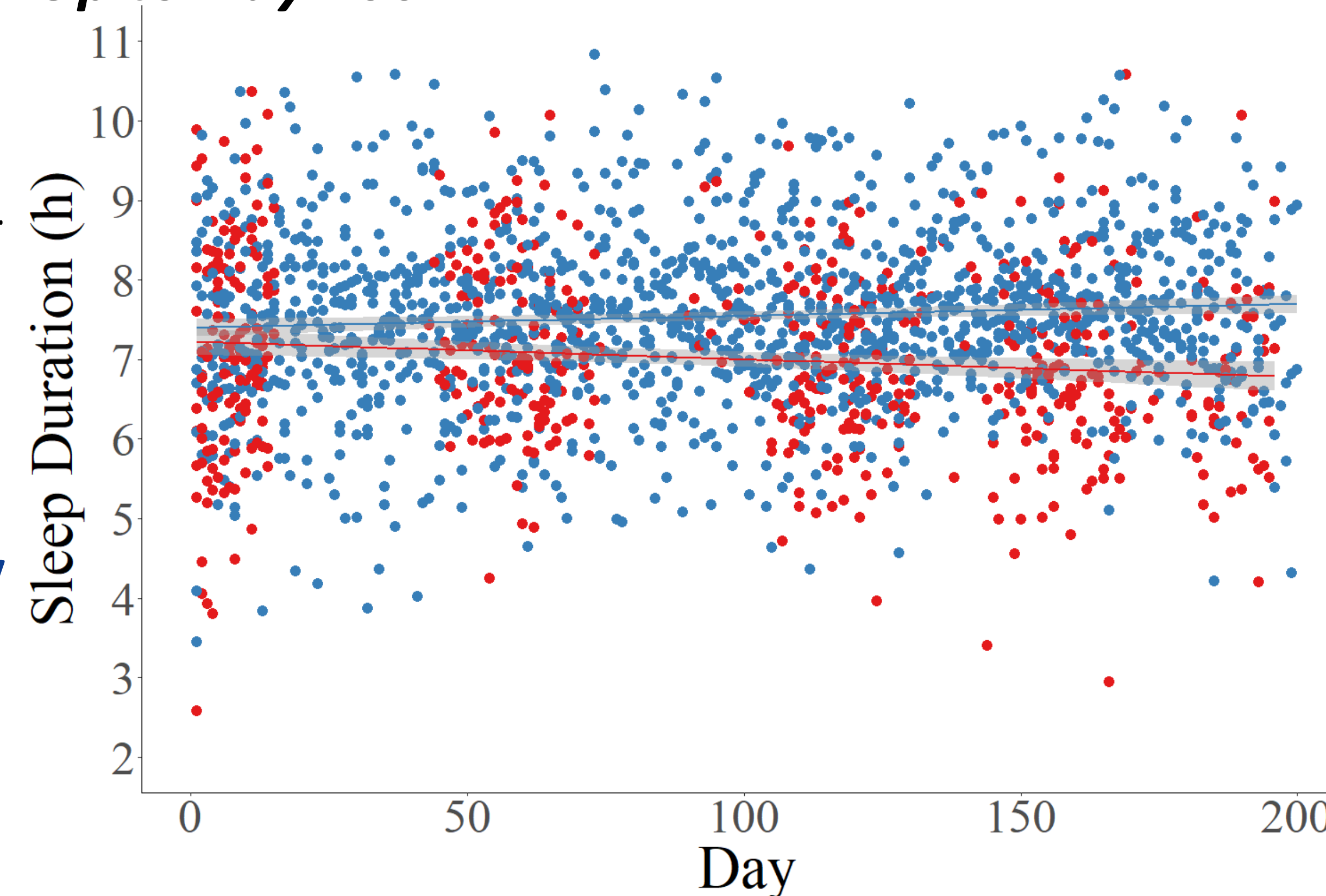
- C: 84.47% days in space
- 2W: 32.95% days in space
  - Over half of EVAs missed
  - 2/3 of visiting vehicles missed

## Sleep Duration by Day Inflight

Full Day Range



Up to Day 200



2-Week Bins

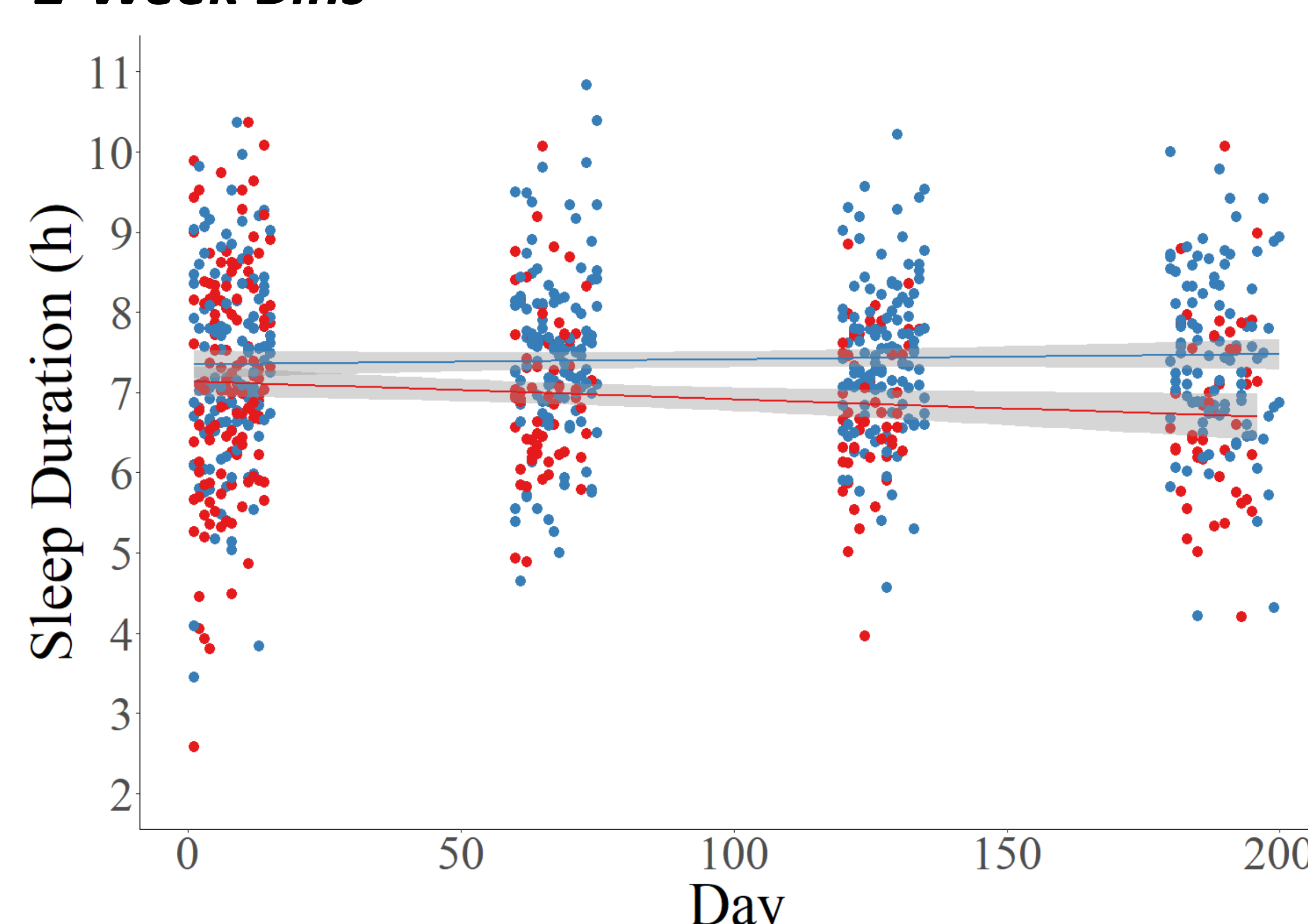


Table 1A – Preflight

|                  | L-270 (C)<br>N = 6 | L-270 (2W)<br>N = 9 | L-180 (C)<br>N = 7 | L-180 (2W)<br>N = 9 |
|------------------|--------------------|---------------------|--------------------|---------------------|
| Sleep Duration   | 8.13 (0.38)        | 7.71 (0.70)         | 8.21 (0.35)        | 7.59 (0.47)         |
| Sleep efficiency | 84.53 (4.10)       | 84.06 (5.65)        | 86.66 (3.44)       | 83.93 (7.74)        |
| Awakenings       | 30.01 (6.91)       | 25.96 (7.75)        | 30.66 (9.94)       | 25.18 (8.49)        |
| WASO             | 48.23 (15.42)      | 46.98 (17.90)       | 42.89 (12.93)      | 46.86 (18.41)       |
| Sleep Latency    | 11.07 (7.41)       | 9.65 (7.35)         | 9.95 (6.98)        | 11.57 (13.20)       |

Table 1B – Inflight & Postflight

|                  | Inflight (C)<br>N = 9 | Inflight (2W)<br>N = 10 | Postflight (C)<br>N = 9 | Postflight (2W)<br>N = 10 |
|------------------|-----------------------|-------------------------|-------------------------|---------------------------|
| Sleep Duration   | 7.51 (0.33)           | 7.00 (0.39)             | 8.29 (0.71)             | 7.40 (0.64)               |
| Sleep efficiency | 90.73 (1.49)          | 86.85 (2.54)            | 84.76 (3.02)            | 83.63 (7.72)              |
| Awakenings       | 15.30 (2.59)          | 17.31 (4.25)            | 28.88 (7.00)            | 26.67 (7.76)              |
| WASO             | 27.12 (5.52)          | 34.02 (10.45)           | 50.00 (13.74)           | 51.72 (19.94)             |
| Sleep Latency    | 6.02 (4.53)           | 10.87 (5.87)            | 12.80 (7.42)            | 6.53 (5.88)               |

## Conclusion

- Continuous actigraphy data collection yields higher sleep duration and sleep efficiency inflight compared to intermittent data collection
- Sleep duration is lower across pre, in, and postflight for the intermittent group, possibly suggesting a difference in sleep habits compared to the continuous group
- Our findings support the use of continuous actigraphy data collection to ensure reliable sleep estimation throughout the spaceflight mission

## Acknowledgements

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